PROGRAM OF FOREST MANAGEMENT RESEARCH

Intermountain Forest and Range Experiment Station

1. Division of Forest Management. Since the inception of the Intermountain Station, forest management research has been carried on only from the Boise Research Center, Idaho City, Idaho. Discussion of activities of the division is therefore presented under the heading of this work center.

2. Boise Research Center. The Experiment Station at Idaho City was established in 1933 for the primary purpose of serving some 11,500,000 acres of forest land of all types in central Idaho (south of the Salmon River), in forest management and soil stabilization studies. This sizeable area, characterized by rough topography and granitic soils, represents a mountainous storehouse of water and vegetation on which the people in the valleys below depend for their existence and livelihood. The wise use and sustained production of these resources are, therefore, a necessity.

(a) Forest resources of central Idaho. The forest resources of central Idaho are considerable, totalling slightly in excess of 7,600,000,000* f.b.m., and composed largely of ponderosa pine and Douglas-fir but including respectable amounts of spruce, lodgepole pine and true fir. On the Boise and Payette National Forests, where the bulk of these two species stand, it is estimated as of 1945, that there are:

4,058,000,000 f.b.m. on 510,000 acres of virgin forest,

708,000,000 f.b.m. on 180,000 acres of second growth in large sawtimber,

30,000,000 f.b.m. on 13,000 acres of second growth in small sawtimber.

} Excl. pole and saplings

* N.F. only. 35,000,000,000. on all lands.

(b) Forest management problems. Since ponderosa pine is found in the largest sizes, in greatest volumes per acre, and has always commanded the highest price, the problems of managing this species have been given priority over others. Since Douglas-fir is found intermingled with the pine this species has been studied incidentally.

The chief problems connected with ponderosa pine management fall into three categories:

(i) How should virgin and second growth forests be cut in order to raise productivity per acre to an optimum degree? Specifically, what volume per acre, what tree classes, what number of trees per acre, should be removed and how much weight should be given to spacing?

(ii) How early in life and exactly how should second growth ponderosa pine be thinned and pruned to achieve optimum productivity in young stands with a minimum outlay of funds?

(iii) What are the crucial factors which limit the success of natural regeneration, artificial seeding, and planting on forest land?

(c) Forest research program.

(i) Harvest cuttings. In order to determine answers to (b), (i) above, a number of permanent sample plots have been established, some of which date back to 1909. While the early plots are highly valuable from the time standpoint, they leave something to be desired in experimental design. Eight of these plots are on the experimental forest which, being readily accessible, provides a means of close checking and supervision. One plot is on the Salmon National Forest,

and 19 are on the Boise National Forest. Since the experimental forest is considered generally typical of the central Idaho ponderosa pine type it is probable that additional permanent plots will be established in connection with the logging of the Bannock Creek drainage.

These eight methods of cutting plots in the Experimental Forest are being reexamined this year for the second time 15 years after their establishment and some interesting clues on mortality, growth, and restocking should be forthcoming.

These plots and a survey on representative cut-over land in southwestern Idaho have, thus far, revealed the following information:

1. Net growth in virgin forests varies from 355 f.b.m. to -546 f.b.m. per acre; growth in selectively cut forests varies from 75 f.b.m. to 258 f.b.m. per acre.

2. The cubic volume of cut-over stands has increased at the rate of 5.3 percent per annum while virgin stands show an annual increase of only .6 percent for the same period.

3. Douglas-fir grew at a slightly higher rate than ponderosa pine in diameter growth.

4. Mortality in the reserve stand was about 20 f.b.m. per acre with 75 percent due to bark beetles (D. brevicomis).

5. Very little reproduction occurs in the first 10 years following cutting.

6. Caterpillar logging is decidedly more destructive than horse logging in trees per acre killed and in reduction of stocking due to logging.

(ii) Intermediate cuttings. Thinnings. No remeasurement data are yet available to serve as a guide on the efficacy of thinning sapling and pole ponderosa pine stands. It has been indicated that in the former some snow damage may be expected in the first few years after treatment. It is pertinent and propitious to realize the potentialities in the management of second growth pine in the Basin where for some years the large operators have been disposing of land and disdaining the "brush." A reversal of outlook and attitude is now discernible and second growth is now being cut and milled in Idaho City and elsewhere.

Pruning. No final results are yet available on the pruning studies conducted but from the time element at least, the operation of pruning the first 17 feet of bole appears quite feasible compared with accepted cost standards. 3-12 ¢ per tree.

(iii) Silvics. Numerous small studies have been conducted on seed production, seed dispersal, seed viability, factors influencing the establishment and developing of natural regeneration, and logging damage. Some of the more important results of the studies are:

(a) Seed production is greatest in virgin forests and least in 70-year old second growth stands varying extremely from 254,000 in the former to 4,000 per acre in the latter.

(b) Seed cannot be relied upon to travel more than 100 feet in any quantity.

(c) Destruction of seed and first year seedling mortality, however, is extremely heavy.

(d) Rodents and birds account for large numbers of seed. Insolation, drought, and vegetative competition account for large numbers of seedlings. Of all factors, competition is probably the most important.

(e) Ponderosa pine maintains reasonable viability after four years storage under different storage conditions, in air-tight containers.

(f) Based on a study of seven 10-acre sample plots, destruction from caterpillar logging directly or indirectly, resulted in the death of 1,070 seedlings and saplings, 8 poles, and .7 timber trees per acre. An additional 544 seedlings and 6.2 poles per acre were killed by piling and burning slash.

(g) Percentage of area stocked by trees of any size was reduced from 78 percent before logging to65 percent after logging. Slash disposal reduced the stocking an additional 16 percent.

(h) For success in seeding and planting, competing vegetation must be removed before seed is sown or stock is planted, other factors being equal.

(i) Seeding in fall with protection from rodents is obviously necessary for high survival.

(j) Planting small-topped, heavy-rooted stock in shovel dug holes (as opposed to slits) is best.

(k) Unless fall rainfall has moistened 15 to 18 inches of soil depth, planting should be delayed until spring but should be initiated as soon as ground has thawed or snow receded.

(l) Care should replace speed in planting operations.

(m) Stock should be raised from seed of indigenous trees.

(n) Particular attention should be given to the time of lifting transplant stock in relation to root activity and its care until planted.

New Program

While the new forest management research program has not been finally formulated, it is believed that initially it may take the form of:

1. Harvest cutting.

(a) Mature Timber. The logging of Bannock Creek drainage over a period of years with the installation of methods of cutting plots designed with the knowledge gained from past regional and ex-regional studies of similar kind, consideration of current logging methods and present and discernible future local demands and local economic stability. Particular attention will be given to the reduction of logging damage, believed to be of particular importance in Inter-mountain country, conceivably by the use of horses or considerably smaller tractors than those now in vogue. The determination of the lightest cut which will "proof" the reserve stand against mortality would be useful to know.

(b) Immature Timber. This will require the acquisition of additional area to the Experimental Forest which should be no obstacle. There are many acres of 60-85 year-old second growth forests in which very light cuttings would benefit the stand, yield a modest merchantable harvest at a profit and probably increase the productivity per acre at the earliest possible time. Applicable information on the management

of second growth stands which have just reached merchantable size and which are increasing in total area in substantial amounts each year, is lacking at the present time.

2. Timber stand improvement. Studies in thinning and pruning in advanced sapling stands (large enough for pulpwood) could yield useful information which if the present trend in utilization is maintained would be applicable for planning TSI recommendations.

3. Regeneration of cut-over areas. Sizeable areas of unproductive forest land in southwestern Idaho are in need of reforestation. Either a new seeding or planting technique or a fine modification of old methods is required. An alternative would be the development of a means of eliminating competing vegetation on a large scale.

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